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Journal of the Society of Arts.

FRIDAY, NOVEMBER 12, 1858.

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COUNCIL.

The following Institutions have been taken into Union since the last announcement:—

Leicester, Town and County Church of England Institute.

Woolwich, Charlton, and Plumstead Literary and Scientific Institute.

NOTICE TO MEMBERS.

The One-Hundred-and-Fifth Session of the Society will commence on Wednesday next, the 17th inst. The Chair will be taken at 8 o'clock on the following Wednesday Evenings:—

1858.	November	—	—	17	24	—
,,	December	1	8	15	22	—
1859.	January	—	—	19	26	—
,,	February	2	9	16	23	—
,,	March	2	9	16	23	30
,,	April	6	13	—	27	—
,,	May	4	11	18	25	—
,,	June	—	—	—	—	29*

For the Meetings previous to Christmas, the following arrangements have been made:—

November 17.—Introductory Address on the Opening of the One-Hundred-and-Fifth Session, by the Chairman of the Council, Mr. C. Wentworth Dilke.

, On this evening the Medals which were awarded by the Council for Papers read at the Weekly Evening Meetings during the last Session, and for articles submitted to the Society's Committees, will be distributed.

November 24.—Mr. F. Joubert. "On a Method of rendering Engraved Copper-Plates capable of Producing a greatly-increased Number of Impressions."

December 1.—Mr. Hyde Clarke. "On Copper-Smelting."

December 8.—Mr. P. A. Halkett. "On Guideway Agriculture; being a System enabling all the Operations of the Farm to be performed by Steam Power."

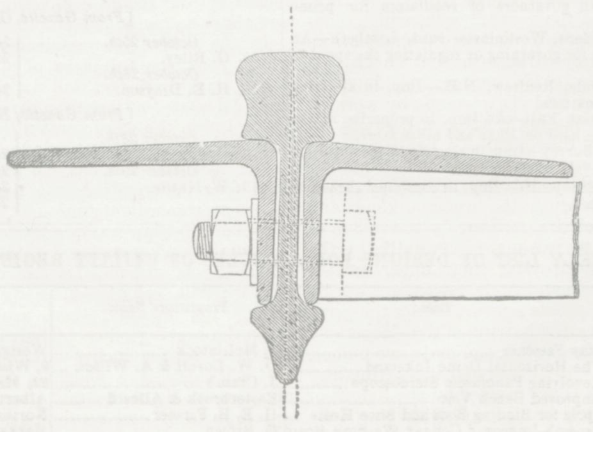
December 15.—Mr. E. J. Reed. "On the Modifications which the Ships of the Royal Navy have undergone during the Present Century, in respect of Dimensions, Form, Means of Propulsion, and Powers of Attack and Defence."

December 22.—Dr. Forbes Watson. "On the Growth of Cotton in India."

ADAMS'S SYSTEM OF PERMANENT WAY.

In February, 1856, an account was given in the pages of this *Journal* of a system of Wrought-iron Permanent Way for Railways, by Mr. W. Bridges Adams, denominated the Suspended Girder Rail. The testimony in its favour by several eminent railway engineers, and the practical experience since gained confirmatory of their opinions, together with its adoption for more than one important line, make it probable that this class of way will be ultimately preferred, wherever iron is considered imperative and timber inadmissible. Experiments are still going on to ascertain the minimum of bearing surface which will suffice, in order to to keep down the weight and cost to the absolutely requisite quantity, and it is probable that a considerable reduction will be the result. For the purposes of export to India this is of great importance, as every ton weight averages thirty shillings for freight—about one-sixth added to the original cost of the materials. And wrought-iron is in all structures a very considerable reduction of dead weight, with equal strength and greater security as compared with cast-iron. The two sections hitherto applied are as follows:—Single-headed (Fig. 1) and Double-headed (Fig. 2).

Fig. 1.



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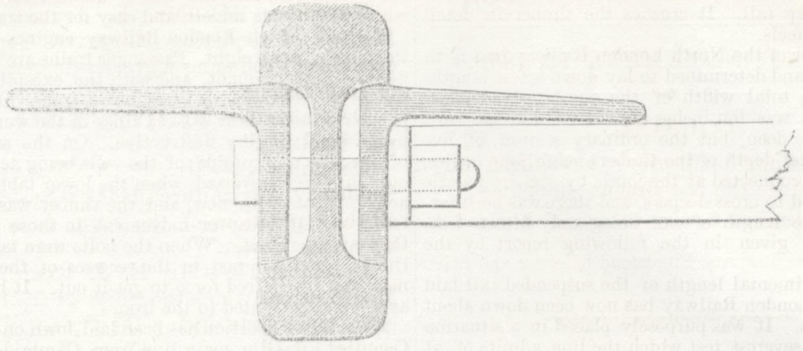
* The Annual General Meeting: the Chair will be taken at 4 o'clock. No Visitors are admitted to this Meeting.

Fig. 2.



Meanwhile two of the highest Indian authorities—the East Indian Railway and the Great Indian Peninsular Railway—appear to consider the question of iron sleepers a most important point, judging from their half-yearly reports. The East Indian engineer states that the cast-iron sleepers are a comparative failure, and that they are being removed into branches and sidings, and being replaced on the main line with timber sleepers. The Great Indian Peninsular engineer, on the contrary, states that the destruction of timber sleepers is as ten per cent. compared with five per cent. of the cast-iron sleepers. In the absence of specific information as to the cause of failure, is is to be presumed that the failure of the cast-iron is from breakage—a defect from which the wrought-iron system is free—and the failure of the timber must be either from the white ant or from splitting by moisture and heat.

Structure has, no doubt, much to do with it, both in the case of iron and timber. A bad form of cast iron will ensure breakage even with a surplus amount of weight, and the mode in which timber sleepers are commonly used with double-headed rails, both in England and India, is not favourable either to the durability of the rails or timber.

The timber sleepers are usually ten inches in width, five inches in depth, and from nine to ten feet long. At each end of the sleepers is fixed down, by iron spikes or wood trenails, a mass of cast iron called a chair, now usually varying from 25 lbs. to 42½ lbs. each. In these chairs, the distance of which apart on the sleeper determines the gauge, are fixed the rails, the opening being sufficient to drop them in from above, and they are secured by wooden keys driven in laterally outside. The rail is composed of three members or portions, the lower table, the upper table, and the vertical web, which connects them together. The rail resting in the chair on its lower table acts as a prop to sustain the wheels. If the rails and chairs are always in contact, no blow will ensue, and when the upper table is worn out by work, it may be turned down, and the lower table will supply an unworn surface, with only the defect of a bad bearing in the chair, by reason of the worn surface of what was the upper table. But, practically, the running of the wheels causes lateral blows which crush the wooden keys, and the rails get loose in the chairs, striking a succession of hard blows well-known to passengers, crystallizing the texture of the rails, and destroying their upper surface by the blows of the wheels and their lower surface by blows on the chairs. All this is aggravated by the great elevation of the rails above the bearing of the sleepers on the ballast. The rail is five inches, the chair two inches, and the sleeper five inches, total twelve inches; thus any loosening of the wood key is aggravated by the height of the prop, and a rocking motion ensues which disturbs the bearing of the sleepers, and, in wet weather, lets in the water beneath them. To solidify the sleepers below, it is thus needful to dig out 12 inches of material to get at them, and this leaves loose ballast above when again filled in, which is disadvantageous in many ways. In this particular the wrought iron suspended girder is particularly advantageous. It is not requisite to open up the ground to get at it, and the upper surface is always firm and solid.

The principle of the wrought iron way, *i.e.*, suspending the rail from the upper table instead of propping it on the lower table, has, for a considerable time past, been applied to timber as well as to iron, and for those who think timber sleepers better than iron, the advantages, mechanical and economical, hereby attained, are very great. In the first place, as the rail is suspended by the upper table, it does not need one half the strength of the vertical web, but merely enough to hold the top and bottom tables together, as in an ordinary bridge girder. Consequently, weight can be saved in the rails, and at the same time their depth can be increased. An ordinary rail is five inches in depth, and as the strength of a beam is as the square of its depth 5 × 5 represent 25, whereas 6 × 6 represent 36, or one half increase and 7 × 7 represent 49 or nearly double.

In the side channels of these deep rails are bolted lateral timbers, four inches wide by four inches deep, by key bolts, three feet apart, making a total width of eleven inches. The rail is thus compounded of a central iron bar between two timber bars which give it great lateral strength in addition to its own increased vertical strength.

The lower rails are connected togther at the joints by brackets of wrought angle iron, bolted down to a cross sleeper. If the rails are long, a central cross timber, four inches by four inches is secured to the central key-bolts, and thus the gauge is secured.

In the ordinary cross-sleeper road there is a sleeper every yard, the full area of which is about seven and a half superficial feet, but the practical bearing is generally calculated at less than three-fourths. On the longitudinal plan the whole area may be reckoned, and therefore the area of the suspended plan is fully equal to that of the cross-sleeper plan, while the height of the rail is only four inches above the bearing, instead of twelve inches on the ordinary method.

When this plan was first proposed it was imagined that the small bearing surface of the rail on the timber by which it was suspended would crush in and destroy the timber; but calculation easily demonstrates the contrary. For instance, there are six chairs to an 18-feet rail; the bearing of each chair on the timber sleepers is about 48 square inches—total, 288. in the suspended method there is a width of three-quarters of an inch along each side of the rail, amounting to a total of 320 square inches,—and continuous.

But, it was argued, on the Great Western system of the bridge rail there are 1,080 square inches in the same length, and yet it crushes into the timber. Quite true, but the reason is obvious. It is a shallow and not a deep rail, and it does not distribute its load over a long space, as does the deep rail. It crushes the timber in detail beneath the wheels.

The engineer of the North London Railway had faith in the system and determined to lay down a few lengths on trial. The total width of the combined rail and lateral timbers was ten inches and a half, and the rails used were not deep, but the ordinary section of five inches—the total depth of the timbers being four inches. The rails were connected at the joints by cast-iron angle brackets secured to cross sleepers, and there was no intermediate tie, the length of rail being only fifteen feet. The result is given in the following report by the engineer:—

"The experimental length of the suspended rail laid on the North London Railway has now been down about twelve months. It was purposely placed in a situation exposed to the severest test which the line admits of, at the foot of a steep gradient, on a sharp curve, and at a station where numerous trains stop and pass through every hour.

"From the weekly reports furnished by the Company's inspectors, combined with my own occasional examination, I am able to state, with confidence, that the result of this trial has been very satisfactory in respect of durability and of economy. The original outlay is less than that required for the ordinary modes of construction, and the cost of manufacture is trifling, while the road is smooth and easy for the traffic."

On the North London Railway engines are used of thirty-five tons weight. Passenger trains are incessant,—goods trains frequent, and with the exception that the speeds are not quite so great as on some other lines, it is one of the hardest worked lines in the world, and the use of breaks is very destructive. On the sample piece of line, the upper table of the rails being actually worn out, they were reversed, when the lower table was found as perfect as when new, and the timber was absolutely free from any wear or movement in those parts where the rail bore on it. When the bolts were taken out the timber remained fast in the recesses of the side channels, and it required force to get it out. It had become, as it were, cemented to the iron.

Since then, a portion has been laid down on the Eastern Counties line—the main line from Cambridge, near the locomotive sheds—where it has been examined by several engineers, and highly approved of. The movement is easier and smoother than on any other part of the line, though only the ordinary rails and not improved rails have been used, and the common sleepers cut down the middle have been used, instead of proper longitudinals.

We come now to the question of cost and comparison.

Cross Sleeper Line.

Quantities in a single mile.

		Tons.	Cwt.		£	s.		£	s.	d.
504 Rails, 21 feet long	70 lbs. per yard, 5 in. deep	110	0	at say	8	0		880	0	0
504 pairs Fishes	22 lbs. per pair	4	19	,,	9	0		44	11	0
2016 Bolts		1	2	,,	20	0		22	0	0
3520 Cast Chairs	28 lbs. each	44	0	,,	5	0		220	0	0
7040 Spikes	1 lb. each	3	3	,,	12	0		37	16	0
3520 Wood Keys				,,	5	0		18	0	0
1760 Cross Sleepers creosoted	5 in. × 10 in. × 9 ft., 4s. 6d. each	130	0					396	0	0
18864 Parts.		293	4					1618	7	0
	Freight to India at 30s. per ton							439	10	0
								£2057	17	0

Suspended Rail on Timber Longitudinals.

		Tons.	Cwt.		£	s.		£	s.	d.
504 Rails, 21 feet long	65 lbs. per yard, 6 in. deep	102	3	at say	8	0		817	4	0
504 pairs Angle Joints, 1 ft. 6 in. long	28 lbs. per pair	6	6	,,	9	0		56	14	0
1008 Bolts for Angle Joints	1½ lbs. each	0	13½	,,	20	0		13	10	0
3520 Key bolts for timber	2½ lbs. each	4	0	,,	12	0		48	0	0
1008 Angle Joint Spikes	1 lb. each	0	9	,,	12	0		5	8	0
1008 Timber Longitudinals	5 in. × 4 in. × 19 ft. 6 in., 56 loads	42	0	,,	3	10	Load	196	0	0
252 Cross Sleepers	5 in. × 5 in. × 9 ft., 4s. 6d. each	19	0	,,	3	10	do.	56	14	0
252 Wood Ties	4 in. × 4 in. × 4 ft., 2 loads	1	12					7	0	0
8056 Parts.		176	3½					1200	10	0
	Freight to India at 30s. per ton							264	5	3
								£1464	15	3

The Cross section and Plan of the suspended rail are here given. It will be seen that to remove the rail it is not necessary to remove the timber, but only the joint bolts, both sides being alike. Fig. 3 is the Cross section. Fig. 4 the Plan.

	£	s.	d.
Assuming these prices to be correct, the saving on first cost by the improved system in England is per single mile	£417	17	0
In India, taking the difference in freight, there is a saving of	175	4	6
Total saving	£593	1	6

With a rail of one-half more vertical strength.*

If the same principle of side bolting be adopted with Cast iron sleepers in the strongest mechanical section, as Fig. 5, the cost per mile will be—

	Tons.	Cwt.		£	s.	d.
504 Rails	102	3	at £8	817	4	0
3520 Pairs cast Side Brackets	100	0	,, 5	500	0	0
4024 Key Bolts, 3 lbs. each	5	8	,, 12	64	16	0
504 Tie Bars, 12 lbs. each	2	14	,, 12	32	8	0
	210	5		1414	8	0
Freight to India 30s. per ton				315	7	6
				£1729	15	6

A sample of this has been applied on the South-Western Railway.

The saving in this mode as compared with the common system will be £326 0s. 0d. Cast-iron can of

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* The timber longitudinals may be applied in shorter lengths, break-joint if preferred.

FIG. 3.

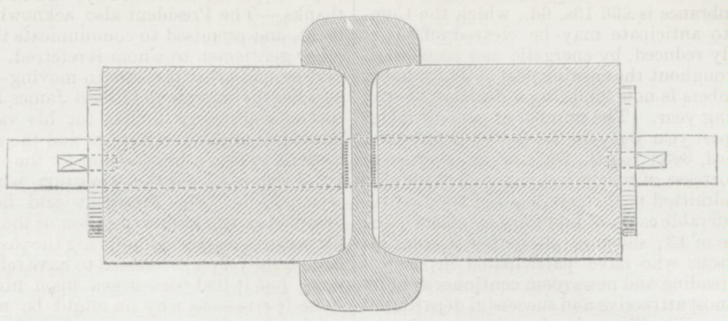


FIG. 4.

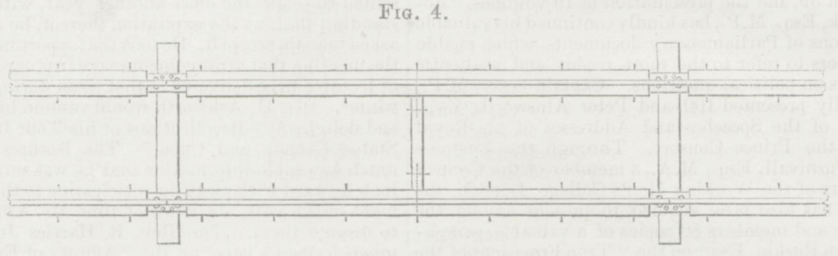
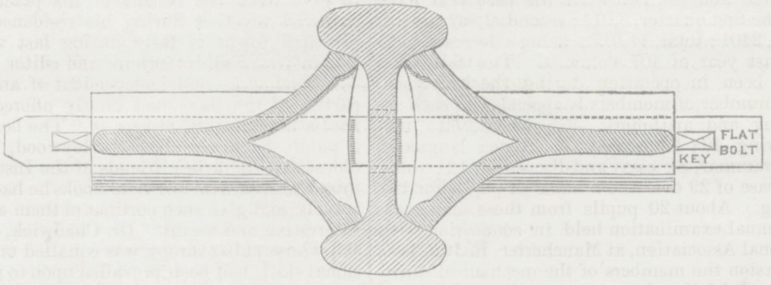


FIG. 5.



course only be used in short lengths, and not continuously like wrought iron. The minimum ultimate cost of the wrought iron way is not yet ascertained, the reduction in scantling being still in course of experiment, but enough has been shown to induce those interested to institute a very searching inquiry into the whole matter.

In using the small scantling of timber, two obvious advantages arise,—lower cost of material, and greater facility for creosoting, if that process be applied. It will bring a simpler and cheaper class of timber into use for railway sleepers. This system is really lower in cost than the American system, which has been adopted from the temporary ways of English contractors, but with the advantages of a double-headed rail of less comparative weight, but really equivalent to two rails, the lower side remaining undamaged while the upper side is wearing out. And in addition to this there is a great saving in the depth of ballast.

The prominent distinction between the American system and the English system, is, that in England a double headed rail is used, secured in a cast iron chair. The cost of these cast iron chairs, and their freight and transit rendered it necessary to dispense with them for poor lines, and in the absence of other knowledge, the double-headed rails was also dispensed with, and the flat bottomed rail of only half the service substituted for it. This new system of side bearers in the channels practically doubles the duration of the rails while diminishing the cost.

In considering the question of freight as an element in all distant Colonial lines when the material is supplied from England, India has been taken as affording the broadest comparison.

Proceedings of Institutions.

BOLTON MECHANICS' INSTITUTION.—The twenty-third annual meeting was held in the Reading-room of this Institution, on Wednesday evening, the 20th ult., when there was a respectable and moderately numerous gathering of the members and their friends. The chair was occupied by G. J. French, Esq., president; and among others present were Mr. Ald. Heywood, Dr. Chadwick, Dr. Haddock; T. Holden and A. Ferguson, Esqrs.; Messrs. John Entwisle, J. H. Raper, I. Barrow, W. Abbatt, A. Ridings, G. Toulmin, Paul Beswick, R. Hadfield, A. Lawson, W. H. Horrocks, J. Waring, &c. The Chairman briefly opened the proceedings, and called upon Mr. Barrow, the acting secretary, to read the report, which, after announcing the gratification of the Committee that the position of the Institution had improved during the past year, both numerically and financially, states that the debt upon the general account has been reduced from £54 12s. 2½d. to £35 18s. 8½d., while that incurred by the removal from Bridge-street to the present premises, which, at the last annual meeting, was

£60 5s. 1½d., is now £30 14s. 9½; so that the entire amount of encumbrance is £66 13s. 6d., which the Committee venture to anticipate may be cleared off, or, at least, very greatly reduced, by energetic and economical management throughout the ensuing year. The number of honorary members is now 98, being a decrease of two upon the preceding year. The number of general members during the past year was—in the first quarter, 320; second, 291; third, 303; fourth, 262; or an average of 294; being an increase of ten on last year. The number who have been admitted to the privileges of the Institution by the transferable cards of honorary members is 78; being an increase of 13; showing altogether a total increase of 21 persons who have participated in its advantages. The reading and news room continues as heretofore to be the most attractive and successful department of the Institution. The library has been increased by the purchase of 59, and the presentation of 19 volumes. Joseph Crook, Esq., M.P., has kindly continued his valuable contributions of Parliamentary documents, which enable the members to refer to the most recent and authentic authorities on political questions. Captain Gray, M.P., has liberally presented 100, and Peter Ainsworth, Esq., 50 copies of the Speeches and Addresses of his Royal Highness the Prince Consort. Through the kindness of F. J. Furnivall, Esq., M.A., a member of the Council of Teachers of the Working Men's College, London, the President has also been enabled to present among the committee and members 80 copies of a valuable pamphlet by John Ruskin, Esq., on the "True Functions of the Workman in Art." The number of volumes now in the library is 4,689, and the issues for the past year have been:—For the first quarter, 3,014; second, 2,867; third, 2735; fourth, 2401; total, 11,017; being a decrease compared with last year of 407 volumes. The following classes have been in operation during the past year. The average number of members is appended to each:—Senior writing and arithmetic, 37; junior, 52; mechanical drawing, 40; landscape, 23; French language, 9; English grammar, 8; essay and discussion, 12; total, 181; an increase of 29 over the number of pupils for the year preceding. About 20 pupils from these classes attended the annual examination held in connection with the Institutional Association, at Manchester, in June last, on which occasion the members of the mechanical drawing class succeeded in bearing away nearly one-third of the certificates awarded in that section, and one member of the arithmetic class was also successful in gaining a certificate. The Committee have abstained during the past year from all hazardous speculations for the amusement of the members, but they have had valuable assistance in gratuitous lectures, which were delivered by the Rev. R. Harries Jones, on "Landmarks of the Reign of Henry Eighth;" the Rev. Samuel Doria, of Wigan, on "The Philosophy of Education;" by the President, on "The History and Manufacture of Stained Glass Windows;" and by Henry Ashworth, Esq., three lectures, being his "Recollections of a Tour in the United States of America, Canada, and Cuba." Mr. Ashworth's lectures will be resumed in the course of the ensuing winter. The annual soirée was held in the reading-room on March 2nd, and was eminently successful. It was attended by about 250 ladies and gentlemen—the utmost number that could be accommodated in the room during tea, but this number was afterwards very greatly increased.—Mr. W. Abbatt moved that the report and financial statement be adopted, printed, and circulated. This was seconded by Mr. Waring, and carried unanimously. Mr. A. Ferguson moved the thanks of the members "to those gentlemen who have aided the Institution during the past year, by donations of money or books, by the gratuitous delivery of lectures, or by giving their services as teachers of classes. Mr. John Entwisle seconded the motion; and, alluding to the teachers of the classes, especially named Mr. Paul Beswick, for the efficient manner in which he had conducted the French class. The resolution was passed unanimously, and Mr. Beswick returned thanks.—The President also acknowledged the compliment, and promised to communicate the resolution to the other gentlemen to whom it referred. Mr. Ald. Heywood said he had great pleasure in moving—"That the members hereby express to Gilbert James French, Esq., their cordial and hearty thanks for his valuable services as president of the Institution, and their desire that he will consent to retain his position for the ensuing year." Dr. Chadwick seconded the resolution, which was carried by acclamation. The President said he felt very much gratified at the kind expression of their satisfaction with his services as president during the past year. He should have been very glad indeed to have relinquished the office now; but it had been urged upon him, and there were some few reasons why he might be more useful in the coming year than one newly elected. He therefore consented to retain the office another year, with the understanding that, at the expiration thereof, he should not be asked to again accept it. He took that opportunity to inform the meeting that arrangements were in progress for a series of lectures to be delivered in that room during the ensuing winter. Mr. H. Ashworth would resume his instructive and delightful "Recollections of his Tour in the United States, Canada, and Cuba." The lectures conveyed so much agreeable information that he was sure they would look forward with pleasing anticipation to the commencement of the year, about which time Mr. Ashworth hoped to resume them. The Rev. R. Harries Jones had promised to read a paper on the "Affinity of European Languages," and Thomas Barnes, Esq., had kindly consented to give them the benefit of his practical observations gathered together during his residence in some of the principal towns of Italy during last winter. Thomas Ballantyne, Esq., proprietor and editor of the *Statesman*—a London journal, independent of any of the political parties of the day—had kindly offered to prepare and read a non-political lecture on "The best means of using a public library." Robert Heywood, Esq., one of the oldest and staunchest friends of the Institution, had promised to look over the note-books he had kept during his travels, and give such portions of them as he might think interesting and useful. Dr. Chadwick, so well known to all, whose philanthropy was equalled only by his professional skill, had been prevailed upon to promise papers on some scientific subjects of real practical interest and value. That to be first treated of was "Water, its composition and impurities." Should the members take the interest in this and kindred subjects of physical science which their importance deserved, he hoped that Dr. Chadwick might be induced to extend his papers to other branches of domestic and household science. The Rev. H. Powell, vicar of Bolton, promised to deliver a lecture on his "Personal recollections of the Island of Ceylon, its natural productions, agriculture, inhabitants, religion, &c." For his own part, if agreeable to them, he proposed to read something about the life and times of the late Samuel Crompton, a Bolton worthy, less known than he ought to be to the present generation of his townsmen. He was not without hope that other gentlemen might be induced to give similar aid to the Institution, and also that a system of exchanging lectures with some of the Institutions in neighbouring towns might eventually be arranged, by which they might be able reciprocally to benefit each other. All, however, depended on the reception given to the lectures by the members. Hitherto it had been the custom to invite the general public to attend lectures and entertainments got up by this Institution, charging a small sum for the admission of such persons as were not members. No practical advantage had been derived from this arrangement, the receipts being usually so small as to be unworthy of notice; while there was a difficulty at a crowded meeting in knowing who were and who were not members. It was therefore suggested whether it might not be better to confine the admission to the lectures of the ensuing season to the members of the Institution only, or to entitle each member to introduce one lady. Mr. Richard Hadfield moved a resolution to this effect, which was seconded by Mr. A. Lawson, and carried unanimously. Dr. Haddock moved a vote of thanks to the vice-presidents, trustees, officers, and retiring committee, which was seconded by Mr. W. H. Horrocks, and carried unanimously. After some discussion the officers and committee were elected for the ensuing year, and the meeting closed with a vote of thanks to the president for his services in the chair.

Chichester Literary Society and Mechanics' Institute.—The members of this Society held their annual meeting in the Lecture-hall at Southgate, on Wednesday morning, the 6th October, when there was a large attendance. William Gruggen, Esq., having been called to the chair, the secretary (after some routine business) read the report from the retiring committee, from which it appears that this Institution continues to maintain its hold upon public favour, as the present number of members, 514, sufficiently demonstrates. It was stated that not fewer than 1,313 persons had inspected the museum during the past year, this collection, through the skill and attention of Mr. Hills, the curator, forming one of the most interesting features among the objects of interest in the city. Mention was next made of the principal donations recently received, particularly those of Walter Mantell, Esq., consisting of a quantity of fossil bones of an extinct species of gigantic birds from New Zealand. In regard to the library, the condition of the books, and the addition recently made, the report speaks favourably. The circulation during the past year had nearly reached the number of 10,000 volumes, including a large proportion of educational and instructive works. The report then adverted to the attempt made some months since to establish a reading and news-room, assigning as the cause of its failure the lukewarmness and indifference of the persons—the apprentices and working men—for whose benefit it was more especially designed. Having referred to the success which attended the past session of lectures, a confident hope was expressed that the series in course of delivery would prove highly attractive as well as instructive. The report concluded by gratefully acknowledging the deep obligation the Society is under to Mr. Gauntlett, "whose energy and zeal, as secretary to the Institution, have so greatly contributed to its continued prosperity." The financial statement exhibited an income of £275 1s. 4d., with an expenditure of £277 10s. 1d., leaving a balance due to the treasurer of £2 8s. 9d., a result attributable to the large outlay incurred by the publication of a new catalogue of the library, on which only a comparatively small return has been hitherto received. On the appointment of officers for the year ensuing, his Grace the Duke of Richmond was re-elected president; the Rev. John Fullager, Dr. Tyacke, and Messrs. B. Adams, and W. Gruggen, vice-presidents; H. W. Freeland, representative to the Society of Arts; Mr. G. Paull, treasurer; Mr. T. Pescod, honorary curator of apparatus; Mr. J. Gauntlett, secretary; Messrs. Barnard and Allen, auditors; and the following gentlemen members of the committee:—Rev. W. Watkins, and Messrs. Allen, Arnell, Biffin, Charge, Dale, Fuller, Jones, Mittin, Molesworth, Pullinger, Purchase, Roper, Rodgers, Sawyer, Seaman, Spring, and E. Wyatt. The thanks of the meeting were voted to W. Mantell, Esq., for his valuable donations to the museum; to Messrs. Baxter, of Lewes, for a complete series of the *Sussex Express*, in twenty-one handsomely bound volumes; to the gratuitous lecturers during the past year; and to Mr. Freeland, for his services as representative to the Society of Arts. A vote of thanks to the chairman closed the proceedings. On the evening following, the opening lecture of the session was delivered by Professor Creasy, M.A., on "The Scientific and Practical Study of History," when the learned gentleman, in an able and eloquent discourse, after defining the meaning of the term "History," pointed out the proper limits and objects of historical inquiry, and entered at considerable length into the best methods of acquiring a comprehensive and accurate knowledge of this subject. There was a numerous attendance, and at the close a vote of thanks to the lecturer was carried by acclamation. And, on the evenings of the 19th and 20th inst., Dr. G. Kinkel lectured on "Art during the Middle Ages, from the Norman Conquest to the Reformation," when he gave very great satisfaction to crowded assemblies of the members.

Lockwood (Mechanics' Institute).—The third quarterly meeting of the members and friends of this Institute was held on Saturday evening, 9th October. Bentley Shaw, Esq., J.P., president, occupied the chair. On and around the platform were the Revs. J. B. Bensted, M.A., and J. R. Jagoe; Messrs. C. Kaye, J. Brierley, J. Crosland, J. W. Spedding, G. Shaw, S. Black, T. Haigh, S. Beaumont, S. Lodge, J. Shaw, &c., &c. An interesting paper on "Progress: or the Life of George Stephenson," was read by Mr. Nathan Jagger. The chairman remarked that the paper showed great research, and was calculated to effect much good. Recitations were given by the members; and the singing-class, assisted by Mr. Allan Lee, and accompanied on the harmonium by Mr. Bartimeus Robinson, executed several pieces of music. The certificate awarded by the Society of Arts to John Brammer, for proficiency in arithmetic, was presented to him by the president, who expressed himself much gratified with the dilligence and attention evinced by the candidate. He hoped to see many members of the Institution follow in the same steps, and concluded by advising the candidate to resolve firmly to persevere in the course he had begun. Votes of thanks were given to the lecturer, the singers, the reciters, and the chairman, after which the proceedings terminated.

MEETINGS FOR THE ENSUING WEEK.

Mon.......British Architects, 8.
Tues. ...Statistical, 8. Rev. C. B. Robinson, "On the Statistics of Prices in the Peculiar of Snaith, Yorkshire, in the Sixteenth, Seventeenth, and Eighteenth Centuries."
Civil Engineers, 8.
Wed. ...Society of Arts, 8. Mr. C. Wentworth Dilke, Chairman of Council—Address on the opening of the 105th Session.
Geological, 8. I. Dr. Rubridge, "On some points in the Geology of parts of South Africa." II. Mr. Stow, "On some Fossils from South Africa."
Thurs....Chemical, 8. I. Mr. Kynaston, "On some Analyses of the Malvern Waters." II. Messrs. Perkin and Duppa, "On Bibromacetic Acid." III. "On the Atomic Weights of the Elements."
Linnæan, 8.

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, Nov.* 5, 1858.]

Dated 27*th September*, 1858.

2160. X. Boutteville, Paris—An improved neckcloth or tie, means of connecting ties to collars and bands, and an improved collar. (A com.)

Dated 14*th October*, 1858.

2288. C. Cowper, 20, Southampton-buildings, Chancery-lane—Imp. in the manufacture of articles of hard vulcanized india-rubber, gutta-percha, and similar gums. (A com.)

Dated 19*th October*, 1858.

2330. W. F. Batho and E. M. Bauer, Salford—Imp. in screws, worms, and wheels, and in machinery or apparatus for cutting the same.
2332. A. Allan, T. Whimster, and R. Gray, Perth—Imp. in steam boilers, also applicable in part to gas meters, lamps, and lubricating and other apparatus requiring a constant liquid level, and in part to pressure-indicating apparatus.
2334. W. E. Newton, 66, Chancery lane—Imp. in apparatus for washing clothes and other articles. (A com.)
2338. Capt. J. Grant, Hyde-park-street—Imp. in constructing and arranging ovens suitable for baking bread.

Dated 20*th October*, 1858.

2340. L. Stiebel, London, and C. F. O. Glassford, Greenwich—Imp. in machinery for moulding washing blues and other materials while in a plastic state.
2341. R. D. Clegg, Manchester—Imp. in screws.
2343. R. Griffiths, 69, Mornington-road, Regent's-park—Imp. in baths.

2344. **T. Twells, Nottingham—Imp. in machinery for embroidering or ornamenting woven, looped, or laced fabrics.**
2345. J. Wainwright, Birkenhead—Imp. in ventilating houses and other places.
2346. S. T. Clarke, 30, Kildare-terrace, Westbourne-park—Imp. in apparatus for crossing bankers' cheques and drafts.

Dated 21st October, 1858.

2347. C. C. Alger, Parliament-street, Westminster—Imp. in cupola furnaces.
2348. J. Marland and S. Marland, Sun Vale Iron Works, Walsden, Lancashire—Certain imp. in power looms.
2349. P. Clerc and A. Piaget, 4, Newcastle-place, Clerkenwell—An improved method of winding watches, chronometers, and time-pieces, without the use of a separate key.
2351. J. M. Napier, York-road, Lambeth—Imp. in printing presses and printing machines.
2353. G. Redford, Moseley, Worcestershire—A circular and self-acting cartridge pouch.
2354. J. Baldwin, jun., Birmingham—Imp. in files or holders for papers, letters, bags, and other similar articles.
2355. R. A. Brooman, 166, Fleet-street—Imp. in knitting frames. (A com.)
2356. R. A. Brooman, 166, Fleet-street—Imp. in apparatuses for regulating the supply of fluids. (A com.)
2357. R. A. Brooman, 166, Fleet-street—Imp. in cocks, taps, and other apparatuses for regulating the flow of fluids. (A com.)
2358. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in apparatus for lubricating railway axles and other bearings. (A com.)

Dated 22nd October, 1858.

2359. J. Burridge, 151, Great Portland-street—Imp. in fire-lighters.
2361. J. Bagnall and W. Bagnall, Westbromwich, Staffordshire—An imp. in the manufacture of iron.
2362. A. Shaw, The Earle's Field Works, Grantham, Lincolnshire—A new method or mode of raising nap on the linings of sheep skins.
2363. R. Waller, 50, Baker-street, Portman-square—Imp. in obtaining motive power, and in apparatus connected therewith.
2364. R. Kennedy and J. Armstrong, Lisburn, Ireland—An improved kiln for drying grain.
2365. C. Clay, Walton-grange, Wakefield—Imp. in apparatus for harrowing, scarifying, and cultivating land.

Dated 23rd October, 1858.

2366. Edwin Palmer and Edward Palmer, Thetford—Imp. in machinery or apparatus for cutting hay, straw, or other similar substances.
2367. P. C. Stortz, Havelock-buildings, Bold-street, Liverpool—An imp. for taking life-size pictures from smaller pictures, either with or without the aid of photography.
2368. E. C. Shepard, Jermyn-street, Westminster—Imp. in electric lamps. (A com.)
2369. R. Bodmer, 2, Thavies-inn, Holborn—An improved toy or plaything for children. (A com.)
2370. G. Davies, 1, Serle-street, Lincoln's-inn—Imp. in weaving. (A com.)
2371. J. C. Martin, Fern-cottage, Charlewood-road, Putney—An imp. in the manufacture of metal moulds for moulding plastic substances.
2372. W. E. Newton, 66, Chancery-lane—Imp. in pumps. (A com.)
2373. W. E. Newton, 66, Chancery-lane—Imp. in telegraphic apparatus. (A com.)

Dated 25th October, 1858.

2374. E. Cottam, Lower Belgrave-place, Pimlico—Imp. in the internal fittings of carriages.
2375. M. Mason, Manchester—Imp. in elevating stands or stages for the use of hosemen in extinguishing fires, also for decorating windows, public buildings, and other purposes.
2376. **J. J. Welch and J. S. Margetson, Cheapside—Imp. in the manufacture of scarfs for gentlemen's wear.**
2377. Capt. Fowke, R.E., Park-house, South Kensington—Imp. in umbrellas and parasols.
2378. J. Robb, Aberdeen—Imp. in propellers for ships and boats.
2379. T. Ashworth and J. Ashworth, Pendleton, Lancashire—Certain imp. in power-looms for weaving.
2380. W. Craddock and J. White, Archer-street, Saint James's—Imp. in the connecting links of harness hames.
2381. G. Kent, High Holborn—An improved churn. (A com.)
2382. A. V. Newton, 66, Chancery-lane—An imp. in the manufacture of candles. (A com.)
2383. S. R. Parkhurst, New York, U.S.—Imp. in cotton gins.

Dated 26th October, 1858.

2384. M. Mason, Manchester—Imp. in self-acting feeding machines, or apparatus for all descriptions of steam or other letter-press printing machines or presses.
2386. C. Wieland, Warkworth-terrace, Commercial-road, Limehouse—Certain imp. in chronometers, watches, and such like timekeepers.

WEEKLY LIST OF PATENTS SEALED.

[*From Gazette*, *Nov.* 5, 1858.]

November 5th.

1005. J. S. Willway.
1007. W. Heap.
1008. E. J. Scott.
1009. H. Ashworth.
1015. J. Wright.
1024. J. J. Field.
1033. J. T. Robson.
1041. W. H. Ogden.
1145. F. G. Underhay and J. L. Clark.
1193. C. Cowper.
1195. V. L. Vodoz.
1293. D. Irons.
1313. T. W. Mellor and W. Jamieson.
1481. H. W. Wimshurst.
1987. W. Warne.
2007. W. P. Piggott and S. Beardmore.
2013. S. Hoga, W. P. Piggott, and S. Beardmore.
2023. W. Tucker.
2087. A. H. J. Bastable.

[*From Gazette*, *Nov.* 9, 1858.]

November 9th.

1046. W. G. Taylor.
1047. J. B. Pim and C. Payne.
1052. E. Fairburn.
1053. J. Soutter.
1055. A. Parkes.
1056. A. Parkes.
1063. L. Durand.
1064. M. Diosy.
1066. J. A. Clarke.
1071. R. Knight
1075. W. S. Bailey and W. H. Bailey.
1079. A. M. Dix.
1090. J. Macintosh.
1199. C. Stanley and J. Fittall.
1463. J. Shaw.
1464. J. Shaw.
2085. G. C. Grimes.
2098. J. R. Scartliff.

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

[*From Gazette*, *Nov.* 5, 1858.]

November 1st.

2450. J. Patterson.
2486. W. Gardner.
2486. A. C. L. Devaux.
2532. A. V. Newton.
2552. J. Homan.

November 3rd.

2487. R. A. Brooman.
2509. W. Lund and A. Bain.

[*From Gazette*, *Nov.* 9, 1858.]

November 4th.

2561. J. Burrows.

November 5th.

2492. R. Threlfall and J. Higson.

November 6th.

2503. W. Davis.
2504. Louis Benoit Advielle.
2512. H. J. Betjemann.
2597. G. Collier and J. W. Crossley.

WEEKLY LIST OF DESIGNS FOR ARTICLES OF UTILITY REGISTERED.

No. in the Register.	Date of Registration.	Title.	Proprietors' Name.	Address.
4131	November 4.	Well Bucket	Edward P. Capper	West Maitland, New South Wales, Australia.

LIST OF PRESENTS.

The following presents have been made to the Society during the past year. The thanks of the Society have been forwarded to the donors.

Presents.	Donors.
Specifications of Patents up to the present time, and Indexes	Commissioners of Patents.
Abridgments of ditto	„
Commissioner of Patents' Journal..	„
Synopsis of the Patent Laws of various Countries, by Alexander Tolhausen, Ph. D.....................	The Author.
Memoirs of the American Academy of Arts and Sciences, Vol. vi......	Academy.
Proceedings of ditto, pp. 185–248...	„
Transactions of the American Philosophical Society, Vol. ii., p. 1 ...	Society.
Proceedings of ditto, Vol. vi., No. 56	„
Transactions of the Academy of Science of St. Louis, Vol. i.	Academy.
Report upon Public Schools and Education in Rhode Island, U.S.	E. R. Potter.
Proceedings of the Academy of Natural Sciences of Philadelphia for 1857................................	Academy.
History of Wisconsin, by W. R. Smith, Wisconsin..................	Wisconsin Historical Society.
1st and 2nd Annual Report of the Wisconsin Historical Society	„
Maddison, Wisconsin: its Growth, Progress, Condition, Wants, and Capabilities, by Lyman C. Draper (4 copies, with maps)	„
Annual Report of the Geological Survey of Wisconsin, by J. G. Percival..........................	„
City of Waterton, Wisconsin: its Manufacturing and Railroad Advantages, &c.	„
United States Patent Office Reports for 1855. Mechanics, 2 vols.; Agriculture, 1 vcl.	U.S. Patent Office.
Barnard's American Journal of Education, Vol. i., 1856................	Hon. H. Barnard.
Messages from the President of the U.S. to the two Houses of Congress, at the commencement of the 3rd session of the 34th Congress, Parts 1 & 2	Smithsonian Institution, U.S.
The Reports of the Secretary of the U.S. Treasury on the state of the Finances for 1855–6.	„
Do. do. Commerce and Navigation of the U.S.	„
The Report of the Superintendent of the U.S. Coast Survey for 1855...	„
Smithsonian Contributions to Knowledge, Vol. ix.	„
Annual Reports of the Board of Regents of the Smithsonian Inst., 1855-6	„

Presents.	Donors.
Report of Experiments with Small Arms for the Military Service, by Officers of the Ordnance Department of the U.S. Army	„
An Account of the Smithsonian Institution: its Founder, Building, Operations, &c.	W. J. Rhees.
Journal of the Agricultural and Horticultural Society of India, Vol. ix., part 3	Society.
Proceedings of the Royal Geographical Society, Vol. i., Vol. ii., parts 1, 2, 3, 4, 5	„
A new system of Chemical Philosophy, Part 2, 1810, by Dalton	Manchester Literary and Philosophical Society.
Do. do., Vol. ii., part 1, 1827, by Dalton	
Do. do., Part 1, 1842, by Dalton..	
Dalton's Meteorology (2nd Edition), 1834	
Memoirs of the Literary and Philosophical Society, Manchester, Vol. xiv.	Society.
Manual of Arithmetic, by Rev. J. Galbraith and Rev. S. Haughton..	The Authors.
Do. Plane Trigonometry, by do. do.	„
Do. Euclid, by do. do.	„
Do. Mechanics, by do. do............	„
Do. Hydrostatics, by do. do.	„
Do. Optics, by do. do..................	„
Do. Astronomy, by do. do.	„
Civil Service Competitions considered as a means of promoting Popular Education, by Horace Mann	The Author.
Antimonium en Platina van Borneo, onderzocht en Beschreven, door Prof. S. Bleekrode	„
Transactions of the Silesian Society for 1856..................................	B. Hebeler.
Report of Council of Art Union for 1857	Art Union.
Journal of the Royal Dublin Society, Nos. 4, 5, 6; Vol. i.	Society.
Transactions of the Historic Society of Lancashire and Cheshire, Vol. ix., 1856–7	„
Journal of the Statistical Society of London, Vol. xx., part 4; Vol. xxi., parts 1, 2, 3....................	„
The Cotton Trade; two Lectures, by Alderman Baynes	The Author.
Brief Extracts from Memoranda of the Earl of Dundonald	Earl of Dundonald.
Colonization, Defence, and Railways in our Indian Empire, by Hyde Clarke	The Author.

Presents.	Donors.
Ornamental Drawing and Architectural Design, by R. Scott Burn ...	,,
De Surinaamsche Geta Pertsja, door Prof. S. Bleekrode ...	,,
Study of Living Languages, by Col. Arthur Cotton ...	,,
Histoire d'une Bulle de Gaz, par M. Jobard ...	,,
American Journal of Science and Art, September, 1857 ...	
Canadian Naturalist and Geologist, Vol. ii., No. 4; Vol. iii., Nos. 1, 2, 3 ...	Montreal Natural History Society.
Journal of the Dublin Geological Society, Vol. vii., part 5; Vol. viii., part 1 ...	Society.
Canadian Journal, Nos. 12, 13, 14, 15, & 16 ...	,,
Transactions of the Linnæan Society, Vol. xxii., part 2 ...	,,
The Life Boat, Nos. 1 to 29 ...	Life Boat Inst.
The "Bauhütte," 12 Nos. ...	The Director.
Mémoires de L'Académie Impériale de St. Petersburg, Tome viii ...	Academy.
The Atlantis, Nos. 1 & 2 ...	The Editors.
Proceedings of the Royal Society, Vol. ix., Nos. 28, 29, 30 ...	Society.
Philosophical Transactions of the Royal Society of London, Vol. cxlvi., parts 2 & 3; Vol. cxlvii., parts 1, 2, 3; Vol. cxlviii., part 1..	,,
Quarterly Journal of the Chemical Society, Vol. x., part 4 ...	,,
Quarterly Journal of the Geological Society, Vol. xiv. ...	,,
Reports of the Inspectors of Factories for half-year ending Oct. 1857, 12 copies ...	A. Redgrave.
The History and Design of the Foundling Hospital, with a Memoir of the Founder, by J. Brownlow ...	The Author.
Iron Ship-building, with Practical Illustrations, by John Grantham	The Author.
Documents and Proceedings connected with the Donation of a Free Public Library and Museum, by W. Brown, M.P., to the Town of Liverpool ...	Liverpool Free Library.
Reports on the Use of the Steam Coals of the Hartley Districts, by W. G. Armstrong ...	The Author.
Crosby Place: its Antiquities and Reminiscences, by the Rev. C. Mackenzie ...	Committee of the CrosbyHallEvening Classes.
The Rise and Progress of Australia, Tasmania, and New Zealand, by D. Puseley ...	The Author.
Journal of the Royal Agricultural Society, Vol, xviii., & Vol. xix., part 1 ...	Society.
Journal of the Proceedings of the Linnæan Society, Vol. ii. ...	,,
Delille's Easy French Poetry, for beginners ...	The Author.
Report on the Sanitary Condition of London, for 1856-7, by H. Letheby, M.B. ...	,,
A Letter on Steam Cultivation, by Wm. Smith ...	,,
The Punjaub Railway, by W. P. Andrew; 2 copies ...	,,
The Port of Kurrachee, by Do. do. 2 copies ...	,,
The Geologist, Vol. i., Nos. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11 ...	T. A. Readwin.
On the Rapid Transmission of Troops to India, &c., by Capt. Hoseason; 8 copies ...	The Author.
Reviews of the Measures which have been Adopted in India for the Improved Culture of Cotton, by Dr. Forbes Royle ...	Mrs. Royle.
Transactions of the Royal Scottish Society of Arts, Vol. v., part 1 ...	Society.
The Student's Blackstone, by Kerr	John Murray.
Catalogue of the Antiquities of Stone, Earthen, and Vegetable Materials in the Museum of the Royal Irish Academy ...	Academy.
Observations on the Recent Addition of a Reading Room to the British Museum ...	Wm. Hosking.
Memoirs of the Royal Astronomical Society ...	Society.
Paper on the Bhore Ghaut Railway Incline ...	J. J. Berkley.
Three copies of Third Report of H.M. Civil Service Commissioners ...	C.S.Commissioners
Two copies of Twenty-fifth Annual Report of the Sacred Harmonic Society ...	Society.
Five copies of the History, Cultivation, Composition, and Feeding Properties of the Mangold Wurzel	John Tynan.
Elliot's Practical Geometry and Mensuration, and Key to ditto ...	The Author.
The Mortality of the British Army, by Dr. W. A. Guy ...	The Author.
Coal, Smoke, and Sewage, scientifically and practically considered, by B. Dixon ...	,,
Book-keeping for Solicitors, &c., by W. Mackenzie ...	,,
Proceedings of the Congrès Internationale de Bienfaisance, 2me Session ...	T. Twining, jun.
Oil Mill Machinery, by Alexander Samuelson ...	The Author.
Two copies of Les Premières Leçons de Calcul, selon la Méthode Naturelle du Pâtre Calculateur de la Touraine, Hen. Mondeaux; Emile Jacoby ...	The Author.
Report of the Directors and Auditors of the Assam Tea Company ...	Company.
On Improving the Sanitary Condition of Large Towns, by fossilising and deodorising all the sewage matters of Dwelling-houses, by J. Lloyd, M.D. ...	The Author.
The State of our Educational Enterprises, by the Rev. W. Fraser	,,
On Deformities, by Henry Heather Bigg ...	,,
Printing: its Dawn, Day, and Destiny, by Henry Bradbury ...	,,
American Journal of Science and Art, May, 1858 ...	
Lectures on Gold, Delivered at the Museum of Practical Geology ...	J. Tennant.
Universal Currency, by T. A. Tefft	The Author.
Deane's Manual of Fire Arms	Longman & Co.
Thames Embankment: Letter from Sir F. Trench to Viscount Duncannon, in 1841 ...	John Leighton.

PRESENTS.	DONORS.
Reports of the Meteorological Department, Board of Trade, 1857 and 1858	Admiral Fitzroy.
Barometer Manual	,,
Barometer and Weather Guide	,,
On a Uniform System of Weights, Measures, and Coins for All Nations, by Prof. Hennessy	The Author.
Report on the Effects of Sewage Contamination upon the River Thames, and Remarks on the Doctrine of Equivalents, by Dr. W. Odling	,,
The Twenty-fifth Annual Report of the Royal Cornwall Polytechnic Society	Society.
Oxford Associate in Arts' Examination, by T. D. Acland	The Author.
Report of the Twenty-seventh Meeting of the British Association for the Advancement of Science	Association.
The Report and Supplement of the Railways of the United States, by Capt. Galton	The Author.
Elements of Inorganic Chemistry, by J. C. Buckmaster	Longman & Co.
Proceedings of the Zoological Society, pp. 339 to 362	Society.
The Atlantic Telegraph, by E. O. W. Whitehouse	Bradbury & Evans.
Considérations Chimiques et Pratiques sur la Combustion du Charbon, by C. W. Williams	The Author.
The Utilization of Town Sewage, by J. H. Gilbert, Ph. D.	,,
Proceedings of the Literary and Philosophical Society of Liverpool, Part 12	Society.
A Short Hand-Book of Philology, by Hyde Clarke, D.C.L.	The Author.
Portrait of Henry Cort	Richard Cort.
Specimens of Photoglyphic Engraving	H. Fox Talbot.
Fac-simile Lithographs by Paul Gauci	The Author.
Views of Steam Trains of the Oriental Inland Steam Company; (2 chromo-lithographs)	John Bourne.
List of Photographs as presented by the Art Union of London to their Subscribers	Art Union of London.